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R. Mallet, Esq., C. E., read the following—

REMARKS OCCASIONED BY CAPTAIN BLAKELY'S WRITTEN VERSION OF HIS VERBAL REPLY TO MR. R. MALLET'S PAPER OF JUNE 11, 1860.

At the last meeting of the Academy permission was given to Captain Blakely to transmit, in writing, for publication, his reply, then verbally delivered by him, to my communication as to priority in ordnance with initial tension, read by me on that occasion. Presuming that such writing would be a faithful transcript of the words actually spoken by Captain Blakely, I did not then consider they contained anything worthy of further remark—an opinion entertained, I believe, by nearly all the Members of the Academy who were present.

Having, however, been permitted to read the MS. since sent in for publication by Captain Blakely as the transcript of what he then spoke, it appears to me to differ so much from what he actually did utter, and contains *statements so contrary to the facts to which they profess to allude*, that I have felt compelled to ask the President's permission to record this in the face of the Academy, and to refute the statements and inferences now brought forward by Captain Blakely in a new form, as if having been given verbally by him in reply here on the 11th instant. I am glad to find that the President has given notice of this to Captain Blakely, that he may be present; and I appeal to every Member of the Academy here, who was then present, in support of my denial that Captain Blakely's MS. version of his reply sent in is a true or accurate transcript of what he actually uttered, or even in any respect like it. In a word, his MS. contains several statements, as injurious as they are contrary to fact, which he never uttered at all, or which could be inferred from anything he did utter; and upon these novel and purely imaginary grounds he has proceeded to raise a new argument, not one particle of which was ever uttered by him in this room. It is for the Academy to express its sense of such an abuse of the privilege it gives each Member, *suo periculo*, upon his own *honour*, to transmit an exact statement, in writing, of what he actually uttered, when intended for publication in our Proceedings; and I leave it to form its own opinion upon the probable validity of claims that require such a course to prop them up.

I shall contrast, in one or two passages, what Captain Blakely *writes as having said* with what *he actually did say*, and with the facts of the case.

He writes:—"He" (Mr. Mallet) "withdraws his statement, made here on the 14th ultimo, that he had a letter from Dr. Hart, discussing the whole question, and dated July, 1854; and tells us he meant to say, and believes he did say, 1855, not 1854." Now Captain Blakely, to my recollection, did not make such a statement, or anything like it, here on the 11th instant; and, had he done so, I should have at once referred him back to my paper, just read, in which, so far from withdrawing anything whatever, I affirmed that Captain Blakely himself originated his own error of the date of 1854 for 1855, and confirmed this by showing that I *had read out* the dates on the 14th of May last from a written list of dates, and not from any letter of Dr. Hart's. I have read no letter whatever, nor any part of any letter, from Dr. Hart throughout this controversy; and I appeal to you, Mr. President, as having occupied the Chair on the 11th instant, whether my own first words addressed to you, after Captain Blakely sat down, were not these:—"Sir, I have heard what Captain Blakely has said in reply, and have nothing to withdraw, nothing to alter, in the facts or statements which I have laid before you"? Yet, in face of that, Captain Blakely writes, as words uttered by him in my presence, but never said, that I withdrew a statement as to a letter and a date, both being purely imaginary as matters of fact, and never having had any existence outside his own mistake. To those who were present on the occasion, this is beyond need of comment; but I could not permit it to pass uncontroverted to those who, hereafter and elsewhere, may read our Proceedings.

I shall not follow Captain Blakely through what he has written as having been stated by him on the 11th instant, but nothing like which he uttered, with reference to Dr. Hart himself, in which he expresses his belief that "Mr. Mallet is not an independent discoverer of the principle of construction in question, but that he learned it from Dr. Hart," nor comment upon his affecting to take credit for absence of "personal motive," on his own part, in seeking now to make it appear that there is some question at issue between Dr. Hart and myself. I trust I have placed the facts and dates so truly and clearly before the Academy in my communication of the 11th instant, that no confusion of expressions referring to one thing, and made to appear to refer to another—no use of words in loose or doubtful senses, will confuse or contravene the following plain facts:—That I knew the general principles of increased strength by ringed construction, with initial tension, and had practically applied them to the design of 36-inch mortars before October, 1854, and brought that design publicly forward in December, 1854—several months before I knew Dr. Hart personally, or ever had had any communication with him on any subject; and that, as he first communicated to me the mathematical theory and laws of ringed construction by letter, dated the 6th of July, 1855, and *never communicated to me anything on the subject but his mathematical results,* it is impossible I could have derived my knowledge, anterior in point of date, from him, or derived from him any constructive details of a design, embracing these principles, made in October, 1854—months before I first had the advantage and pleasure of his acquaintance.

I have endeavoured fully and circumstantially to accord to Dr. Hart, in my paper here of the 11th instant, what exactly were my obligations in respect of communication received from him; and I believe Dr. Hart himself to be entirely satisfied with the correctness of every statement I have made with respect to him in this matter, as I am equally so with the substantial correctness of what he has stated in regard to myself. Captain Blakely's "belief" is therefore a matter of indifference to both of us, and equally so that his arguments on this point, as contained in his professed transcript of his reply of the 11th instant, were never, as I believe, uttered at all upon that occasion.

Captain Blakely, in his verbal reply, announced a new claim to priority of his knowledge of the general principles or method of ringed construction never previously mentioned by him, and which attempted to carry back the date to September, 1854. His written statement upon this part of the matter is, however, very different from what he then actually stated. What he said was, "That in the year 1854—it must have been about September"—he proposed to certain authorities in Turkey to strengthen the old bronze kamerlicks of the Dardanelles, and fit them to throw 27-inch shells into Sebastopol, by lapping them round with wire-rope rigging, or, he hesitatingly added, with iron rings; and upon this he left it to be inferred that his claim to knowledge of this principle dated from that time, and so before my design for the 36-inch mortars was first made and brought forward, viz., in October and December, 1854. To that statement I replied that so crude and unpractical a project argued nothing whatever as to any knowledge of the principle of ringed construction with initial tension; that it would occur to any one who proposed to apply those kamerlicks to vertical fire that they must be strengthened in some way, and lapping round with wire rope, just as the Chinese wooden guns are wrapped round with silk, might be to any one a very obvious mode of attempting this without any knowledge of the principles in question; that the method itself was practically useless and valueless, as the wire rope would get "open-jawed" at the first discharge, and cease to grip the outside of the kamerlick; and that, as to the wrought-iron rings, I must express my doubt that any man upon the spot, and having seen those old pieces of ordnance, could have proposed them, as the construction of the kamerlicks rendered it impossible to apply iron rings shrunk on hot, even if the rings themselves could have been obtained, and to the exact size, from England,—the whole idea, also, as described, being that of the use of extemporaneous stores then upon the spot, i. e., the old Turkish kamerlicks, and the wire ropes of the English ships of war in the Bosphorus.

Now, Captain Blakely's *written* version cautiously avoids repeating everything that suggested those difficulties. It merely alleges that "in September, 1854, he made proposals on this subject to Government," and "immediately afterwards" went out to Constantinople and Balaklava, and communicated with the Ambassador, &c.; "and had guns been then strengthened on the plan he suggested, he feels confident," &c., &c. He writes nothing as to what his "proposals" were; he does not even give the meagre details he uttered on the 11th instant; but flourishingly concludes: "So much for priority of suggestion to the authorities." It is a curious fact, in relation to the date (September, 1854) assigned to this "suggestion" by Captain Blakely, that in his later pamphlet ("An Improved New Method of Constructing Cannon," &c., Ridgeway, London, 1858) his chapter iii., p. 37, commences with the following words:—"Having early in January, 1855, informed the Minister of War that I knew of a mode of constructing cannon whereby howitzers could be made large enough to bombard Sebastopol," &c. The proposals seem really the same; how is it the dates so differ?

I remarked, however, on the 11th inst., and again repeat, that, even assuming the earlier date, a crude proposal of this nature, not even in writing, for anything that is affirmed, much less accompanied by any drawings, and not necessarily inferring any knowledge whatever beyond the mere fact (known to every schoolboy) that wrapping rope round a cannon must make it harder to burst than before, without the slightest cognizance of the principle of ringed construction with initial tension, is a very different thing from the substantive design, drawn to scale, in October, 1854, and brought before government officers in December, 1854, and having internal evidence on the face of it, proving incontestibly a knowledge on the part of the designer of *principles*, by which increased strength is so obtained. My appeal is, therefore, still to the design of October—December, 1854—which the Academy have done me the honor to require being reproduced as part of its Proceedings.

In my paper read here the 11th inst., I accorded to Captain Blakely as the earliest date, at which he could show any evidence of knowledge, of method and principle together, of construction with initial tension, that of the bursting of his first gun at Woolwich (the 18-pounder) on the 25th May, 1855. Captain Blakely objects to this, that the gun had to be made before it was burst, and demands to move back the date of his priority, as evidenced by this gun, to the rather indistinct epoch of "early in 1855," and invokes the name of Sir Charles Fox to sustain him.

Sir Charles's own letter, however, which he has published in his pamphlet of 1858, Appendix C, p. 48, unfortunately fixes this date to April, 1855, and at p. 28 of the pamphlet we find stated (by quotation from their Report) that on the 25th of April, 1855, the O. S. Committee was directed to place itself in communication with Captain Blakely relative to fabrication of guns upon his principle," which is obviously the date of his first communication with them.

Suppose we grant Captain Blakely, then, even two months anterior to this, for the concoction of his plan (and assume concoction to be equivalent to publication), it will only bring him back to the 25th February, 1855, which is the date of his provisional specification of his patent, and he is still two months, and better, posterior to the date at which my 36-inch mortar design was publicly exhibited to various persons, besides Captain Boxer and General Portlock.

It would be waste of time after this to discuss the claim *now set up* (in his written statement) *for the first time*, although the word *persist* is used, for the priority of Sir Charles Fox (who never produced a line upon the subject) over Dr. Hart and myself, beyond remarking that Sir Charles Fox's name was not so much as once uttered by Captain Blakely in his spoken reply of the 11th inst. here.

In a word, Sir Charles Fox's name is most illogically introduced into this controversy at all by Captain Blakely, because, whatever may have been that gentleman's private information on the subject of ringed construction of ordnance prior to April, 1855, we have his own assurance, as printed by Captain Blakely, that "he had never taken any step to publish his discovery" (Appendix C, p. 49, Blakely's second pamphlet "On proposed New Method of Constructing Ordnance," &c. Ridgeway: London, 1858), up that date, which is long after my design of 1854; and I am not aware that Sir Charles Fox has himself ever publicly claimed to be a discoverer in the matter at all.

It is not necessary for me to refer to what Captain Blakely has *written*, as to my communication with Dr. Hart, further than to remark that, as I recollect his spoken reply, he *said* nothing whatever like what he has penned on the subject, and that his written words—"Mr. Mallet has read to us one letter in which Dr. Hart gave the same account," &c.—were never uttered by him, or I should have at once required him to name the letter he referred to, as I never read any letter whatever from Dr. Hart throughout this matter.

Those who will peruse my paper read here on the 11th inst., observing the dates, &c., will have no difficulty in clearing up the confusion introduced by Captain Blakely's reference to Dr. Hart's letter to the "Mechanics' Magazine" (February 21, 1857), and seeing its total irrevelance, to which I must add, that nothing of this was alluded to, much less uttered by Captain Blakely in his spoken reply of the 11th inst.

It was remarked here on the last evening by Mr. Jellett, that my paper read here on the 25th June, 1855, was not all read at the time, and that, so far as he could judge, only about one-fifth of its printed matter was then written.

The text of the paper consists of 172 pages, and the notes in close type of 110 pages. If the latter be reduced to the type of the text, they occupy an equal volume very nearly with the text, and as none of the notes were written until the paper was printing, the above estimate of one-fifth becomes two-fifths, even assuming the original fraction of the whole, as in type, correct, which I cannot admit.

I brought the original MS. to the Council, of which I was then a Member, while the paper was being printed, and showed its members that not thirty-five pages (which would be one-fifth), but rather more than 120 pages of the whole 172, were written in full, and that a synoptic statement of all the remainder of the paper, which I exhibited to Council, was also written and upon the table of the Academy on the 25th June, 1855, and I have the MS. now by me; the occasion of this was an objection raised to the cost of printing the large bulk of the notes.

I remarked, in reply to Mr. Jellett on the 11th inst., that, whether this were so or not, was immaterial to the question of priority before us, inasmuch as this does not rest upon my paper of the 25th June, 1855, only (nor necessarily at all), but upon my design of October, 1854.

I further recalled your own recollection, and that of other members of the Academy, to the circumstance that my paper of the 25th June, 1855, had, in fact, not been *read* at all—that, the occasion being that of a visit from the Lord Lieutenant, there was not time to do so, and that I was only permitted to give a *vivâ voce* account of one or two portions of it, and that one of those parts which I then chose for illustration, viz., my explanation of the causes of liability to bursting of cannon when firing red-hot shot, &c., depends upon the very same principles of initial tension and compression, upon which the construction of ringed ordnance depends, and which were then clearly pointed out by me, and, with the aid of large diagrams, exhibited to the Academy.

It is not necessary I should incumber further this already too long controversy, by making any observations upon what Captain Blakely writes referring to his quotation from section 288 (p. 152 of separate edition) of my paper of 25th June, 1855, upon M. Thiery's claims in this matter, further than to say that "the essential and radical distinction" referred to by me in the passage quoted, which must be read in connexion with the preceding section 287, is one between the effects of increased strength, due to construction in *one* extended and *one* compressed ring, and those of construction in *several* superimposed extended and compressed rings, which give still greater or even unlimited strength; but the very same principles are common to both, only carried out more fully in the latter. Captain Blakely uses the passage to make it appear to assert "an essential and radical distinction," not between two *methods*, based upon the same common principle, not of degrees of strength obtained by more or less fully carrying out principles the same in both cases, but as if there were some distinction between the principle itself, which is identical in both.

The object is, of course, to suggest that Thiery's one ply of rings did not anticipate Captain Blakely's self-alleged priority in proposing "one, or more than one." There is nothing, however, to show that Captain Blakely saw any value in more than one upon any principle more recondite than mere increase of thickness, at the date of the specification of his patent, August, 1855, nor until after he had read my paper of 25th June, 1855, and Dr. Hart's investigation printed in the notes to it. Nor does it touch the question of Thiery's priority, whether he failed in practice or not (of which, however, there is no proof whatever), no more than the bursting of Captain Blakely's own guns touches the question of his own originality in respect to time.

Mr. Mallet exhibited simultaneously and explained to the Academy, after reading this paper, his original sheets of designs for the 36-inch mortars in the several phases of their progressive improvement, in proof of the statements as to them, made in his paper of the 11th inst.

The first (that reproduced in the Proceedings—see Plate, page 335), and dated October, 1854, shows the original crude design; the chase and chamber, each constructed in two superimposed rings, one extended and one compressed, that design having been made and exhibited to Captain Boxer, General Portlock, and others, before he had ever had the honour of Dr. Hart's acquaintance, or ever heard of Captain Blakely.

The second is the original contract design for these mortars, with the signature of Mr. Charles Mare, the contractor, upon it, showing the partial abandonment of the construction in plies, the chase being forged in a single thickness, but the compressed and extended construction of the chamber still continued. This was the design as being acted on at the period when Mr. Mallet first called upon Dr. Hart, in company with Professor Downing, and conversed on guns, &c., in April or May, 1855.

The third shows the design in accordance with which the mortars were completed subsequently to the bankruptcy of the first contractor in December, 1855, and in which Mr. Mallet reverted fully to the principle of the original design; and having in the interval had his ideas on the subject of construction with initial tension enlarged and made exact by the mathematical investigations communicated to him by Dr. Hart, 6th July, 1855, was enabled to develop the principle completely in both the chase and chamber, by constructing both in several successive plies extended and compressed.

A. S. Hart, LL. D., Professor Jellet, and Rev. S. Haughton, made some remarks on Mr Mallett's and Captain Blakely's communications.

The Academy then adjourned.

MONDAY, NOVEMBER 12, 1860.

JAMES HENTHORN TODD, D. D., President, in the Chair.

MR HENNESSY, F. R. S., read a paper—

ON A THEOREM RELATING TO CONICAL SURFACES.

THE Theorem is announced as follows :—"If a cone of maximum volume, under a given conical surface, roll on a plane with its vertex constantly touching a point in the plane, the interior envelope of the cone will be a second cone which possesses the property of containing a maximum volume under its total surface."

If we denote by θ_1 the angle at the summit of the cone of maximum volume under conical surface, and by θ_2 the corresponding angle for the cone of maximum volume under total surface, we shall have

$$\sin \tfrac{1}{2}\,\theta_1 = \frac{r_1}{l_1}, \qquad \sin \tfrac{1}{2}\,\theta_2 = \frac{r_2}{l_2},$$

r_1, r_2, being the respective radii of the bases, and l_1, l_2, the respective slant heights of the cones.

By the usual methods we easily find

$$r_1 = \frac{1}{\sqrt{3}}\,l, \qquad r_2 = \frac{1}{3}\,l.$$

Whence

$$\sin \theta_1 = \frac{2\sqrt{2}}{3} \qquad \cos \tfrac{1}{2}\,\theta_2 = \frac{2\sqrt{2}}{3}$$